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ABSTRACT

The data in this study are taken from an on-going research project investigating the development of the production of intervocalic consonants in Mexican Spanish. The total project includes both longitudinal and cross-sectional studies of forty children and uses both naturalistic observation and experimental methods. The data discussed here is from a cross-sectional study that used an imitation task for elicitation and involved sixteen children from the total subject sample. The data are discussed in relation to Roman Jakobson's proposed universal order of acquisition of sound classes as detailed in Jakobson 1939, 1941, 1959 and in Jakobson and Halle 1956. The study strongly suggests that there are powerful tendencies toward a universal order of phonological development and that a universal order of the kind asserted by Jakobson is valid in a probabilistic sense. (Author/NCR)

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THE ACQUISITION OF INTERVOCALIC CONSONANTS IN MEXICAN SPANISH: A CROSS-SECTIONAL STUDY BASED ON IMITATION DATA*

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0. Introduction.

The data to be reported here are taken from an on-going research project which is investigating the development of the production of intervocalic consonants in Mexican Spanish. The total project includes both longitudinal and cross-sectional studies of forty children and uses both naturalistic observation and experimental methods. The data discussed here are from a cross-sectional study which used an imitation task for elicitation and involved sixteen children from the total subject sample. The data will be discussed in relation to Roman Jakobson's proposed universal order of acquisition of sound classes as detailed in Jakobson 1939, 1941, 1959 and in Jakobson and Halle 1956; this remains the most explicitly predictive theory of phonological development (cf. Ferguson and Garnica, forthcoming).

Mexican Spanish was chosen as the language to be studied because of the availability of monolingual Spanish-speaking subjects in the Stanford area, and because of particular characteristics of Spanish since English is the other language for which acquisition data are being gathered by the project, the ultimate goal of cross-language comparison of acquisition will be facilitated by the general similarity in English and Spanish consonantal systems. In addition, Spanish phonology includes several special characteristics which present different problems to the child learning language than can be studied in the acquisition of English.

1. Spanish consonantal system.

Spanish consonantal phonemes may be grouped into three sound classes — stops, fricatives and sonorants. The feature of voicing is distinctive in the stops as /ptk/ vs. /bdg/ and in the fricatives as /fsx/ vs. [β ð ɣ]; however, the voiced fricatives only occur intervocalically, where they function as variants of the voiced stops. The classification of the voiceless affricate /tʃ/ and the glides /w/ and /j/ varies (cf. Alarcos 1950, Dalbour 1969, and Stockwell and Bowen 1965); the affricate will be included here with the fricatives, and the glides will not be considered.[1] The class of sonorants is divided into the nasals /m n ɲ/ and the liquids /l ɾ r/. The symbol /ɾ/ represents the apico-alveolar single flap r, and /r/ stands for the apical trill r phoneme.

A series of voiced and voiceless stops and fricatives, a similar voiceless affricate and 'glides,' a three-way nasal contrast, and an opposition within the liquid class are shared by English and Spanish. The particular characteristics of Spanish

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[1] The glides /w/ and /j/, which also occur intervocalically, were elicited during testing, but have not been included in the data reported for several reasons. In certain position (V__V and $__) and particularly in andante speech style, /w/ and /j/ are strengthened to obstruents: |ɣʷ| for /w/ and |ʤ| for /j/ (Hooper 1972: 528; Harris 1969: 23-24). The resulting confusion between /w/ and |ɣ| is especially common in parts of Mexico (Stockwell and Bowan 1965: 65). Consequently, it was difficult to unambiguously elicit /w/ as distinct from |ɣ|. Even when elicited, the wide range of phonetic variation for the glides both within and between adult dialects complicates the analysis of children's productions. Jakobson also omits glides from his predictions concerning language acquisition.

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not shared by English are the following: (1) the allophonic relationship of voiced fricatives to the voiced stop phonemes; (2) the palatal (rather than velar) nasal; and (3) the two r phonemes. The relationship of [βðɣ] and [bdg] may be expected to complicate the acquisition of the stop/fricative opposition since it involves the learning of phonetic variants (i.e. allophones) in the process — a factor not previously investigated in the literature. The acquisition of the palatal nasal is of interest in comparison with the acquisition process for the velar nasal in English. The contrast between two r phonemes is relatively rare in languages of the world and is complicated in Spanish by distributional rules which restrict the phonemic contrast of /ɾ/ vs /r/ to intervocalic position only.

To study the development of consonants in Mexican Spanish, intervocalic position was chosen, since this is the position of maximal contrast: all sixteen consonantal phonemes occur intervocalically; all but two /ɲ/ occur word-initially, while only five /ɲ n s l d/ appear in final position. Table 1 presents an analysis of the distinctive features and the traditional articulatory classification of the sixteen consonants which were selected for analysis. The distinctive feature matrix is based on the discussions in Jakobson, Fant and Halle 1952, and Jakobson and Halle 1956.[2] Since 1956, a number of other distinctive feature systems have appeared (e.g., Chomsky and Halle 1968, and Ladefoged 1971). However, Jakobson's is used in Table 1 because it is the basis for an acquisition theory (which will be referred to in following sections), and because none of the more recent systems have been applied to acquisition in a similar way.[3]

2. Subjects.

The sixteen children who took part in this study came from monolingual Spanish-speaking families of the lower-income bracket. All the children have parents and siblings without speech defects, were of single birth and had a limited or incomplete phonological system at the time of testing. In addition to age, verification of the requisite acquisition stage was based on the types of substitutions, assimilation patterns and cluster reductions, as obtained from an analysis of a vocabulary corpus elicited during a preliminary visit. Table 2 presents the subject identification number, sex and age of each of the sixteen children.

Six of the children (subjects RC1-6, Table 2) came from monolingual Spanish homes in Redwood City (California) where there is a large Mexican-American community. These Ss (1 female, 5 male) were aged between 2;4 and 3;3 (mean age 2;9) at the time of testing. The data from these Ss consist of the first three testing sessions from a five-month long longitudinal study, and as such, represent a synchronic description of their productions at the beginning of testing. The data on their phonological development over the five months will be presented elsewhere.

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[2] For other feature analyses of Spanish, see: Alarcos Llorach 1950, 1961; King 1952; Saporta and Contreras 1962; Martin 1965; Sableski 1965; Campbell 1966; and Harris 1969.

[3] Smith 1973 uses the Chomsky-Halle system in the study of phonological development but makes no claim about a universal order of acquisition.

Table 1a. Jakobsonian Distinctive Feature Analysis of Spanish Intervocalic Consonant

Inherent Features†	p	t	k	f	s	x	tʃ	β	ð	ɣ	m	n	ɲ	l	ɾ	r̄
A. Sonority																
1. vocalic	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+
2. consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3. compact			+			+	+			+	-	-	+			
4. tense														-	-	+
5. voiced								+	+	+						
6. nasal											+	+	+			
7. discontinuous	+	+	+				+							-	+	+
8. strident*				+	+	-	+	-	-	-						
9. checked**																
B. Tonality																
10. grave	+	-	+	+	-	+	-	+	-	+	+	-	-	-	-	-
11. flat**																
12. sharp**																

* redundant (Jakobson, Fant and Halle 1952: 44).
** not applicable

† The order of features is based on Jakobson and Halle (1956).

Table 1b. Traditional Articulatory Classification of Spanish Intervocalic Consonants

		Front				Back			
		Labial		Dental		Palatal		Velar	
		vl.	vd.	vl.	vd.	vl.	vd.	vl.	vd.
Stops		p		t				k	
Fricative allophones			β		ð				ɣ
Fricatives & Affricate		f		s		tʃ		x	
Sonorants	Nasals		m		n		ɲ		
Liquids	Lateral				l				
	Flap				ɾ				
	Trill				r̄				

Table 2. Identification number, sex and age of subjects, by geographical location

	Sex	Age at beginning of testing	
Redwood City			
RC1	M	3;3	
RC2	M	2;4	
RC3	F	2;7	
RC4	M	2;7	
RC5	M	3;3	
RC6	M	3;1	Mean: 2;9
Mexical City			
MC1	F	1;6	
MC2	M	3;9	
MC3	M	2;4	
MC4	F	6;1 (?)	
MC5	F	4;1 (?)	
MC6	F	2;9	
MC7	F	4;8	
MC8	F	2;3	
MC9	M	2;10	
MC10	F	3;10	Mean: 3;5

Since the Redwood City (RC) children were being raised in an environment in which there was some exposure to English in the community, it was also felt desirable to acquire data from children in a completely Spanish-speaking environment; such data would be necessary to determine the extent, if any, to which English had influenced the acquisition process in RC. Accordingly, a month-long replication of the study was undertaken in Mexico City (MC).

The other ten children (Ss MC1-10) in Table 2 were selected from the subject population tested during the Mexico City replication. The age range for the seven females and three males was 1;6 to 6;1, with a mean age of 3;5. However, these age figures were considered to be suspect, since in one case a mother was inconsistent in reporting her child's birth year (MC5, Table 2), and in at least one other case the mother's claim seemed inappropriate for the child's development (MC4, Table 2). As a result, selection of a Mexico City S depended on acquisition stage, rather than on age. After the preliminary visit (to elicit the vocabulary corpus for the acquisition stage analysis), each of these Ss was tested three times over the one month period.

Since a detailed analysis of the RC and MC data showed that English had apparently had no significant effect on the acquisition of intervocalic consonants by the subjects in Redwood City, the data from the two sets of subjects will be presented together.

3. Collection and analysis of data.

An imitation task was used to collect the data. During each of three testing sessions, the child was asked to repeat nonsense stimuli of the form VCV, which were modeled by the experimenter, a native Mexican Spanish speaker. For every session, each of the sixteen consonants (/p t k, f s tʃ x, β ð ɣ, m n ɲ, l ɾ r̃/) was imitated once. The consonants were rotated through three vowel environments (a _ a, u _ o and i _ e) such that, for each session, every consonant appeared in a new vowel environment. Although every session also included imitations of real words and a sample of spontaneous speech, only the imitation data on the sixteen consonants in the three vowel environments will be presented here. Although the relationship between imitated and spontaneous speech is not always clear, it was felt that data from an imitation task are independently valid, in that such data reflect at least a part of a speaker's competence; that such competence is closely related in process and development to spontaneous speech production is also assumed. Moreover, preliminary analysis showed that for these subjects the imitated and spontaneous consonant data are essentially the same.

All sessions were recorded on a Uher 4000 tape recorder. Each tape was then transcribed independently by two researchers using Revox tape recorders and Superex St-Pro B-V earphones. Each consonant was transcribed in narrow phonetic notation and the environing vowels in somewhat broader notation. The transcription system used is that of the International Phonetic Association, with a child language diacritic system and supplemental symbology developed by the Stanford Child Phonetics Workshop (Bush et al., 1973). While comparing the individual transcriptions, the two researchers listened to the tapes a second time to reach agreement on a final transcription. Unresolvable VCV's were referred to the Workshop for discussion and a consensus transcription. Of the total VCV's, 4.0% of the segmental symbols were unresolved and subsequently referred to the Workshop. For an additional 1.7% of the items, diacritics were disputed; in these cases, both alternatives were recorded on the final transcription data sheets rather than referred to the Workshop.

4. Results and Discussion.

Table 3 presents the intervocalic consonant inventories of each of the sixteen subjects, as determined by correct imitation of the nonsense stimuli. Comparison across subjects yields a tentative acquisition order for several individual consonants and demonstrates the wide range of variation between children. Table 4 gives the number and percent of subjects with stable production of the consonantal classes; comparison across classes suggests an acquisition order for stops, fricatives (including the affricate) and resonants (the nasals and liquids). Jakobson's theory for the universal order of acquisition of sound classes would predict the general order for Spanish acquisition to be: STOPS > NASALS > strident FRICATIVES > one LIQUID > mellow FRICATIVES > AFFRICATES; and FRONT > BACK and VOICELESS > VOICED within each class of sounds.[4] The latest acquisitions in Spanish should be the final additions to the class of liquids.

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[4] The following symbols will be used throughout: > is acquired before; : contrasts with.

	Subjects from REDWOOD CITY						Subjects from MEXICO CITY									
	RC1	RC2	RC3	RC4	RC5	RC6	MC1	MC2	MC3	MC4	MC5	MC6	MC7	MC8	MC9	MC10
p	+	+	+	±	+	+	+	+	+	+	+	+	+	±	+	+
t	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
k	+	+	+	+	+	+	+	+	+	+	+	+	+	±	+	+
f	+	±	–	–	+	+	–	–	+	+	+	+	+	±	+	±
s	–	+	+	+	+	+	–	–	+	?	+	+	+	+	+	+
x	+	+	±	–	+	+	–	–	+	+	±	+	+	+	+	±
ʧ	+	±	–	±	–	–	–	+	±	±	+	–	+	+	+	+
β	–	–	–	–	±	±	–	+	±	+	±	+	±	±	±	–
ð	–	–	–	–	?	–	–	–	–	–	+	–	–	–	+	+
ɣ	±	±	–	–	–	–	–	–	+	±	±	+	+	?	?	?
m	+	+	+	±	±	+	±	+	+	+	+	+	+	+	+	+
n	+	+	+	+	–	+	±	+	+	+	+	+	±	+	±	+
ɲ	±	±	+	+	–	+	–	±	–	+	±	±	+	+	+	±
l	±	±	±	±	–	±	±	+	±	±	–	±	–	–	–	+
ɾ	–	–	–	–	–	±	–	–	–	–	–	–	–	–	–	±
r	–	–	–	–	–	–	–	–	–	–	–	–	–	±	–	–

Key: ? = unscorable responses due to at least one deviant model
+ = 3 out of 3 renditions within adult range
± = 2 out of 3 renditions within adult range
– = 1 or 0 out of 3 renditions within adult range

Table 3: Acquisition of correct production of Spanish intervocalic consonants based on imitation of nonsense stimuli, three responses for each consonant by each of sixteen subjects.

Table 4. Acquisition of stable production of Spanish consonant classes, based on number and percent of subjects with 3 out of 3 productions within adult range.*

	FRONT						BACK						%	
	Labial		Dental		Front		Palatal		Velar		Back			
I.	#	%	#	%	#	%	#	%	#	%	#	%	Sub-total	Total
Stops	14	86%	16	100%	80	94%	-	-	15	94%	15	94%		94%
Nasals	13	81%	12	75%	25	75%	7	44%	-	-	7	44%		67%
Fricatives vl.	9	56%	12	75%	21	66%	-	-	10	63%	10	63%	65%	42%
Fricatives vd.	3	19%	3	19%	6	19%	-	-	3	19%	3	19%	19%	
vl. Affr.	-	-	-	-	-	-	7	44%	-	-	7	44%		44%
Subtotal #	39/(4x16)		43/(4x16)				14/(2x16)		28/(3x16)					
%	61%		67%				44%		58%					
					64%						53%			
						60%								
II.														
Liquids l			3	19%										6%
Liquids ʎ			0	0%										
Liquids r̄			0	0%										
Total I, II						50%								

*i.e., plus (+) scores of Table 3.

Since Jakobson states that the earlier acquisitions have priority over later ones (i.e. occur in greater frequency, singly and in clusters, and have greater assimilatory power), presumably, priority would also imply an earlier uniformity in production for earlier acquisitions. Consequently, for both single consonants and for classes of phonemes, stability of production (as opposed to the first appearance of a contrast) will be used here as indirect evidence of an earlier acquisition. Stability is defined here as three out of three productions within the adult range (+ scores, Table 3; # and % figures, Table 4); having only two productions within the adult range is regarded as evidence of instability (± scores, Table 3).

Since the mean ages of the two groups of subjects were 3;5 (MC) and 2;9 (RC), all Ss had acquired a portion of the consonant system by the time of testing. Fourteen of the sixteen Ss are well beyond the minimal consonantal system /p t m n/

discussed by Jakobson and characteristic of early acquisition as cited in the literature. Even for the two Ss (MC1 and MC2) who are nearest to the minimal system, no substantiation can be made for the posited consonantal order of p > m > t > n. However, if the acquisition order for individual consonants is also reflected in the order in which consonant classes are completed, the data support the generalization that the class of all voiceless stops will be completed before the class of all nasals: fifteen Ss have acquired all three stops, while only four Ss have acquired all three nasals (+ scores, Table 3). If class mastery across all subjects similarly reflects acquisition order, support may be found in the acquisition scores in Table 4 for the implied prediction of voiceless stops > nasals: the sixteen subjects had stable productions 94% of the time for voiceless stops as opposed to 67% of the time for nasals.

Two other predictions are implied in the assertion of a minimal system consisting of /p t m n/, and these are explicitly stated by Jakobson: (1) front consonants will be acquired before back consonants of the same series (1941:53); and (2) voiceless before voiced (1941: 70).

The statistical tendency across all subjects and for all consonants partially supports the claim that front consonants are acquired before back ones (64% stable productions for front versus 53% for back). Within classes, the clearest substantiation is for nasals (78% stable productions for front versus 44% for back). The front voiceless fricatives are slightly more stable than back ones but the difference is not significant (66% stable productions for front versus 65% for back). Front and back stops are equally stable (94%) (Table 4). However, the clear instability of the apparently difficult palatal nasal and Jakobson's claim that palatal : velar is a late acquisition suggestthat were there a four-way contrast of labial : dental :: palatal : velar for each series, the error rate for back consonants would substantially increase and the prediction would be confirmed. For example, if the affricate /tʃ/ is included within the fricative class / f s x/, the relationship between front and back for voiceless fricatives would change to 66% stable productions for front as opposed to 53% for back (Table 4). However, on the basis of the data for stops and fricatives, the back, velar consonants / k x ɣ/ do not appear to be appreciably more difficult than either the labial or dental consonants of the same series, when compared individually.

The prediction of voiceless > voiced can be examined only for fricatives in this data since the study was limited to intervocalic position. Although voicing is phonemic for stops, voiced stops do not occur intervocalically. However, since the voiced stop allophones are fricatives, the voiced/voiceless contrast is maintained in this position, but in the fricative class. Data for the fricatives support the prediction in that voiceless fricatives are stable 65% of the time while voiced fricatives are stable only 19% of the time (Table 4). Since fricatives are easier to acquire in post-vocalic, intervocalic or final position (Ferguson 1973: 80), the particularly low 19% for voiced fricatives may be surprising. Such instability may be due to the general difficulty of voiced fricatives (as reflected in Jakobson's prediction), but may also be due to language-specific difficulties of the voiced fricatives which result from their restricted distribution and allophonic status in Spanish.

After the acquisition of the minimal consonantal system, the major portion of the adult phonemic system is learned: the final additions to the stop and nasal series, all fricatives and affricates, and one liquid (Jakobson 1941:51-57). Thus, for Spanish intervocalic consonants, /k n/, /f s x/, [β ð ɣ], /tʃ/ and /l ʎ or r"/ should comprise the category of major acquisitions. Since Spanish has no contrasts of velar and palatal, or strident and mellow consonants within the same series, and no pharyngealized or palatalized consonants, the predictions concerning those sounds do not apply. Since the data reported here do not include substitutions, Jakobson's predictions concerning substitutions will also be omitted. The remaining predictions, when viewed as a whole, predict that the acquisition order will be: STOPS > NASALS > strident FRICATIVES > one LIQUID > mellow FRICATIVES > AFFRICATE; and FRONT > BACK and VOICELESS > VOICED within each class of sounds. The last acquisitions in Spanish should be the final additions to the class of liquids.

Jakobson's claim of the different acquisition orders for stops and fricatives, due to the priority of dentals among the major acquisitions, is not clearly substantiated. The labial stop should be acquired first, yet for two subjects, /p/ is not mastered (MC8, RC4, Table 3); /t/, however, is stable for all sixteen subjects (Table 4). The labial nasal tends to be slightly more stable than the dental nasal (81% stable productions for /m/ versus 75% for /n/, Table 4) and may be acquired first (RC5, Table 3). No order of acquisition is apparent in the voiced fricatives, but of the voiceless fricatives, the dental fricative is clearly mastered first (75% stable production for /s/ as opposed to 63% for velar and 56% for labial fricatives, Table 4).

The predicted order of stops and nasals before fricatives (1941: 51) is supported: stops (94% stable productions) > nasals (67%) > fricatives (42%). Since nasals should be easier than and learned before fricatives, the small difference between nasals (67%) and voiceless fricatives (65%) may be due to the greater difficulty of the palatal place of articulation /ɲ/ relative to the velar location /x/ (Table 4). For at least one subject (MC1), all stops, including the velar /k/ are mastered before the first fricative; for this subject, the front nasals also emerge before a fricative (Table 3).

Within the fricative class, the predicted acquisition order is generally supported, where it applies to Spanish. The statistical tendency across subjects indicates /s/ as the first fricative to be mastered, as predicted (1941: 55): /s/ (75% stable productions); /x/ (63%) and /f/ (56%) (Table 4). However, for MC2, the only fricative is [β] which is labial not dental; that [β] is also voiced and mellow may also contradict Jakobson's predictions (but, cf. 1956: 43 and 1941:55). Jakobson also predicts that front fricatives and back stops will be acquired before back fricatives (1941:53). In support of this prediction, no S has the back fricative /x/ without having the back stop /k/ and at least one front fricative; four Ss have either no /x/ (RC4) or an unstable /x/ (MC5, MC10, RC3) and have /k/ and either /f/ or /s/, and presumably will acquire /x/ soon (Table 3).

The data conflict with the predicted order "strident fricatives > one liquid mellow fricatives and affricates" (1941: 90; 1956: 42). For twelve subjects, at least one strident fricative is acquired before a liquid; however, for two subjects

(MC1 and MC2), the order is reversed. Ss MC10 and RC5 had acquired both prior to testing. The order "a liquid mellow fricatives and affricates" is supported by three Ss (MC1, RC3, RC5) and partially substantiated by three others (MC3, RC4, and RC6). However, the order is reversed in three Ss (MC5, MC7, MC9) and partially reversed in four other (MC4, MC6, MC8, RC1) (Table 3). A clearer, but contradictory, order pattern emerges from the analysis in Table 4: strident fricatives /fs/ (66% stable productions) > affricate /tʃ/ (44%) > mellow fricatives[5] [β ð ɣ (x)] (28%) > a liquid, /l/ (19%). Note that the class of mellow fricatives is complicated by the inclusion of the voiceless velar fricative, which should be acquired earlier than other mellow but voiced fricatives. If /x/ is excluded, the percentage figure for stable productions of mellow fricatives drops to 19%, the same as for /l/. However, the crucial ordering difference of /tʃ/> /l/ remains.

On the basis of phoneme mastery above (/tʃ/ > /l/), the affricate in Spanish appears to be easier than Jakbonson would have predicted (1941: 91). Furthermore, for some children, the affricate (and the lateral also) may emerge earlier than the voiceless, strident fricatives (MC1 and MC2, Table 3). Jakobson's prediction that the stop and fricative will be acquired before the corresponding affricate does not apply to Spanish, because there is not the necessary three-way palatal contrast in this language.[6]

The last acquisitions should be the additions to the class of liquids. As noted above, a single liquid, the lateral, is acquired early as the only representative of the class. Only one subject deviates from this pattern: MC8 has a rudimentary /rʷ/, and no /l/ or /ɫ/. However, Jakobson allows for either /l/ or ɾ during the stage of the single liquid. On the basis of MC10 and RC6, the opposition l : ɫ may be expected to follow (considerably later) the acquisition of /l/, as predicted by Jakobson (1941: 60); no other S had either a two- or three-way contrast within the liquids (Table 3). If the hypothesis concerning l:ɫ is correct, the opposition ɫ : rʷ would remain as the final acquisition. The liquids comprise by far the most difficult class (only 6% stable productions) and are acquired last (Table 4).[7]

In summary, although individual children may vary the order, the statistical tendency across all subjects suggests the following order for the acquisition of sound classes in intervocalic position:

(I) STOPS > NASALS > { [FRICATIVES voiceless > voiced] ; [AFFRICATE voiceless fricatives > affricate] } > [LIQUIDS /l/ > /ɫ rʷ/]

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[5] Jakobson, Fant and Halle 1952: 25.

[6] Cf. Menn 1973 for clarification of Jakobson's position on this point.

[7] For a full treatment of the acquisition of liquids in Spanish, including discussion of alternative strategies, see Stoel 1974.

(2) [FRONT dental > labial] > [BACK velar > palatal]

5. Conclusions.

The present study is severely limited in scope. It is a cross-sectional study using productions of sixteen Spanish-speaking subjects (ages 1;6 to 6;1) imitating nonsense stimuli containing intervocalic consonants. As such, it would require investigation of longitudinal data, more subjects, spontaneous speech, perception in addition to production, sounds in various positions, and speakers of other languages to give general support to its findings. Given its limitations, however, the study strongly suggests that there are powerful tendencies toward a universal order of phonological development and that a universal order of the kind asserted by Jakobson is valid in a probablistic sense (which allows many exceptions in individual cases), even if not in the absolute sense which seems to be intended in the Kindersprache. There clearly are points of detail in Jakobson's proposed order which need adjustment (such as the position of affricates), and his theory does not deal with a number of crucial issues (e.g., positional variation, relation of vowel order to consonant order, perception vs. production).[8] It is impressive, however, that the findings of the study support the developmental order "stop before nasal before fricative (voiceless before voiced) before liquid" and the order "front consonants before back ones." Such general tendencies call for explanation from linguistic or psycholinguistic theory.

[8] For a fuller discussion of Jakobson's theory in the light of the data from this study, see Macken, forthcoming.

BIBLIOGRAPHY

Alarcos Llorach, E. 1950 (1961, third edition). Fonología Española. Madrid: Editorial Gredos.

Bush, C.N., M.L. Edwards, J.M. Luckau, C.M. Stoel, M.A. Macken and J.D. Petersen. 1973. On specifying a system for transcribing consonants in child language: a working paper with examples from American English and Mexican Spanish. Stanford University: Committee on Linguistics.

Campbell, R.J. 1966. Phonological Analyses of Spanish. Unpublished Ph.D. dissertation, University of Illinois.

Chomsky, N. and M. Halle. 1968. The Sound Pattern of English. New York: Harper and Row.

Dalbour, John B. 1969. Spanish Pronunciation: Theory and Practice. New York: Holt, Rhinehart and Winston.

Ferguson, Charles A. 1964. Baby talk in six languages. American Anthropologist 66, Part 2: 103-114.

_____. 1973. Fricatives in child language acquisition. Papers and Reports on Child Language Development 6: 61-85. Stanford University.

_____ and Carol B. Farwell. 1973. Words and sounds in early language acquisition: English initial consonants in the first fifty words. Papers and Reports on Child Language Development 6: 1-60. Stanford University.

_____ and Olga K. Garnica. (forthcoming) Theories of phonological development.

Harris, James. 1969. Spanish Phonology. Cambridge: M.I.T. Press.

Hooper, Joan B. 1972. The syllable in phonological theory. Language 48: 525-40.

Jakobson, Roman. 1939. The sound laws of child language and their place in general phonology. In R. Jakobson, Studies on Child Language and Aphasia. The Hague: Mouton, 1971. 7-20.

_____. 1941. Kindersprache, Aphasie und allgemeine Lautgesetze. Trans. by Allan R. Keiler. (Child Language, Aphasia and Phonological Universals.) The Hague: Mouton, 1968.

_____. 1959. Why 'mama' and 'papa' In Aaron Bar Adon and Werner F. Leopold (eds.) Child Language, A Book of Readings. Englewoods Cliffs, New Jersey: Prentice-Hall, Inc., 1971. (Original date 1939? in Selected Writings, 538-545, Mouton.)

_____, C.G.M. Fant and M. Halle. 1952. Preliminaries to Speech Analysis: The Distinctive Features and Their Correlates. Cambridge: M.I.T. Press.

Jakobson, Roman and M. Halle. 1956. Fundamentals of Language. The Hague: Mouton.

King, H.V. 1952. Outline of Mexican Spanish phonology. Studies in Linguistics 10: 51-62.

Ladefoged, P. 1971. Preliminaries to Linguistic Phonetics. Chicago: University of Chicago Press.

Leopold Werner F. 1947. Speech Development of a Bilingual Child: A Linguist's Record. Volume 2: Sound-learning in the First Two Years. New York: AMS Press.

_____. 1953. Patterning in children's language learning. Language Learning 5: 1-14.

Macken, M.A. (forthcoming) Jakobson's universal hierarchy as a predictor for consonant acquisition: evidence and evaluation.

Martin, J.W. 1965. Distinctive-feature systems of English and Spanish. Supplement to R.P. Stockwell and J.D. Bowen, The Sounds of English and Spanish. Chicago: University of Chicago Press, 139-52.

Menn, Lise. 1973. Note on the acquisition of affricates and fricatives. Papers and Reports on Child Language Development 6: 87-96. Stanford University.

Sableski, J.A. 1965. A Generative Phonology of a Spanish Dialect. Seattle: University of Washington Press.

Saporta, S. and H. Contreras. 1962. A Phonological Grammar of Spanish. Seattle: University of Washington Press.

Stockwell, R.P. and J.D. Bowen. 1965. The Sounds of English and Spanish. Chicago: University of Chicago Press.

Stoel, Caroline M. 1974. The Acquisition of Liquids in Spanish. Unpublished Ph.D. dissertation. Stanford University.